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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:	Tinku Acharya et al.	§	Art Unit:	2615
		§		
Serial No.:	09/359,523	§		
		§	Examiner:	Dorothy Wu
Filed:	July 23, 1999	§		
		§		
Title:	Image Processing	§	Docket No.	ITL.0237US
	Method and Apparatus	§		(P7323)

Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

RECEIVED

FEB 05 2004

Technology Center 2600

APPEAL BRIEF

Dear Sir:

Applicant hereby appeals from the Final Rejection dated September 16, 2003.

I. REAL PARTY IN INTEREST

The real party in interest is Intel Corporation., the assignee of the present application by virtue of the assignment recorded at Reel/Frame 010124/0767.

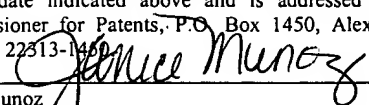
II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

02/03/2004 SSANDARA 00000031 09359523

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Date of Deposit	January 29, 2004
I hereby certify under 37 CFR 1.8(a) that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated above and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.	
	
Janice Munoz	

### III. STATUS OF THE CLAIMS

The application was originally filed with claims 1-18. These claims have been finally rejected and are the subject of this appeal.

### IV. STATUS OF AMENDMENTS

There are no unentered amendments.

### V. SUMMARY OF THE INVENTION

Referring to Fig. 2, an embodiment 20 of a digital camera in accordance with the invention includes a look-up table 26 that is used by the camera 20 to modify raw pixel data (that is provided by an image sensor 22) to compensate for such factors as the white balance of a captured image, nonlinearities introduced by the image sensor 22, and flare effects introduced by a lens 23. In this manner, the look-up table 26 stores values to which the different pixel intensities and colors that are indicated by the raw pixel data are linearly mapped. This mapping, in turn, may compensate for one or more of the factors described above. More particularly, the table 26 may store intensity values in an array of storage locations, and each storage location may be uniquely addressed by a color component (a red, green or blue color component, for example) and the intensity of that color component. For example, for a red-green-blue (RGB) color space, the captured red, green and blue color pixels may be associated with three different groups 40, 42 and 44 respectively, (see Fig. 3), of pixel intensity values in the look-up table 26. As an example, a red pixel (depicted as R(50) in Fig. 3) that has an intensity of fifty may map into a

location of the table 26 that stores an intensity of 42 to produce a transformed red pixel intensity value (called  $R'(42)$  in Fig. 3) of 42. Specification, pp. 2-3.

Instead of establishing the values of the table 26 in view of specific image sensor, lens and/or lighting conditions, the camera 20 may update the values of the table 26 in an iterative calibration process to optimize the values for the particular conditions and components being used in the camera 20. Thus, in a sense, the values of the table are self-adjusting to accommodate the non-ideal effects that are introduced by the camera 20 and to accommodate the use of different sizes and types of components in the camera 20. In this manner, the camera 20 may initialize the table 26 with a set of values in an attempt to sufficiently compensate the raw pixel data that originates with the image sensor 22. The camera 20 may then analyze the image that is indicated by the transformed pixel data, determine if the white color balance of the indicated image is acceptable, and if not, change the values in the table 26 to improve the quality of the next image that is produced by the camera 20. Specification, p. 3.

The camera 20 captures and processes a particular optical image 18 in the following manner. The lens 23 and possibly other optics focus the optical image 18 onto the image sensor 22, and in response, the image sensor 22 furnishes signals that indicate the intensities of pixels of the captured image, i.e., indicates the raw data. If the image sensor 22 does not provide the red, green and blue (RGB) colors for each pixel location, then a color synthesis circuit 24 of the camera 20 may be used to interpolate the missing colors for each pixel location. For example, the image sensor 22 may provide pixel data from which a Bayer pattern (for example) color synthesis may be used to interpolate the

missing RGB colors for each pixel location to form three intensity values (for the three colors) for each pixel location. Specification, pp. 3-4.

The resultant raw pixel data that is provided by the color synthesis circuit 24 (or image sensor 22, if the image sensor 22 provides true color pixel data) serves as indexes to point to the appropriate data in the table 26. The transformed data that is provided by the table 26 may then be processed by a color correction circuit 30 that transforms the pixel data so that the red, green and blue spectral responses of the indicated image match the corresponding spectral responses of the human eye. After this transformation, a color space conversion circuit 32 may convert the pixel intensities into a standard color space, such as a YCbCr color space, for example. From the data that is provided by the color space conversion circuit 32, a white color balance circuit 28 computes the white color balance of the image. Specification, p. 4.

In some embodiments, if the computed white color balance is outside of a predetermined range, then the white color balance circuit 28 changes the values in the table 26, and the camera 20 passes the captured frame through the above-described transformations again. In this manner, after determining that a particular image has an unacceptable white color balance, the white color balance circuit 28 may multiply the values of each group 40, 42 and 44 (see Fig. 3) of the table 26 by associated scalars  $\alpha_R$ ,  $\alpha_G$ , and  $\alpha_B$ , and subsequently, the new values in the table 26 may be used in the next set of transformations. Specification, p. 4.

Thus, in some embodiments, the circuitry of the camera 20 forms a feedback loop that may be used in an iterative process to compensate for the white color balance, as the

camera 20 permits processing of the image to account for other camera-introduced non-ideal effects before attempting to modify the values of the table 26 to readjust the white color balance. In some embodiments, when the camera 20 is in a still capture mode, the camera 20 may process the still image in the above-described feedback loop to adjust the values in the table 26 until the white color balance is acceptable. In other embodiments, the camera 20 may use a predetermined number (two, for example) of passes through the feedback loop. Thereafter, as long as the camera 20 is turned on, the camera 20 may periodically check (every ten frames, for example) the white color balance to determine if the white color balance is in a predetermined range, as the lighting conditions (one of the main variable) may remain substantially the same over a small number of frames.

Specification, pp. 4-5.

For video, in some embodiments, the camera 20 may permit each frame to pass through even if the white balance is unacceptable, as the camera 20 may make corrections to each successive future frame until the white color balance is properly adjusted. Once adjusted, the camera 20 may periodically check the white color balance (via the white color balance circuit 20) during selected frames of the video. Specification, p. 5.

Among the other features of the camera 20, in a bypass mode, the camera 20 may include a bypass path 39 for communicating the raw pixel data directly from the image sensor 22 to a computer 290. An edge enhancement circuit 34 may receive pixel data for an outgoing frame from the color space conversion circuit 32 and modify the data to further emphasize edges of the image to improve the image's contrast. A compression circuit 36 may compress the pixel data that is provided by the edge enhancement circuit 34

to reduce the bandwidth used to communicate a particular frame to the computer 290. Instead of communicating the frame to the computer 290, the frame may be stored (at least temporarily) in a memory 37. Specification, p. 5.

Referring to Fig. 4, as a more specific example, the camera 210 may include a capture and signal processing unit 248 that may interact with the image sensor 22 to capture the optical image and transfer a frame of data that indicates the resultant raw pixel data to a random access memory (RAM) 263. To accomplish this, the capture and signal processing unit 248 may be coupled to a bus 220, along with a memory controller 261 that receives the frame from the bus 220 and generates signals to store the data in the RAM 263. Indications of the look-up table 26 may also reside in the RAM 263. A processor 262 may access the data in the RAM 263 to perform, for example, the color synthesis, look-up table transformation, color correction, color space conversion, white color balance computation, and edge enhancement functions. The processor 262 may be coupled to the bus 220 via a bus interface 270. In this context, the term “processor” may generally refer to one or more microprocessors, such as a microcontroller, an X86 microprocessor, an Advanced RISC Machine (ARM) microprocessor or a Pentium® microprocessor, as just a few examples. Specification, pp. 5-6.

Among its other features, the camera 20, the camera 20 may include a compression unit 268 that may interact with the RAM 263 to compress the size of the processed frame before storing the compressed frame in the memory 37, such as a flash memory 278. To accomplish this, the compression unit 268 may be coupled to the bus 220, along with a flash memory controller 274 that receives the compressed frame from

the bus 220 and generates signals to store the data in the flash memory 278. To transfer the compressed frame to the computer 290, the camera 20 may include a serial bus interface 266 that is coupled to the bus 220 to retrieve the compressed frame from either the RAM 263 or the flash memory 278. The serial bus interface 266 may generate signals on a serial bus 280 (a Universal Serial Bus (USB), for example) to transfer an indication of the compressed frame to the computer 290. The USB is described in detail in the Universal Serial Bus Specification, Revision 1.0, published on January 15, 1996, and is available on the Internet at [www.intel.com](http://www.intel.com). The camera 20 may also include a read-only memory (ROM) 269 that may be coupled to the bus 220. The ROM 269 may store program 170 that causes the processor 262 to perform the above-described functions when the processor 262 executes the program 170. Specification, p. 6.

To summarize, the camera 20 may use the following technique 300 (depicted in Fig. 5) to process an optical image captured by the camera 20. In particular, the camera 20 may capture (block 302) an optical image, interpolate (block 304) any missing pixel colors from the captured image, select (block 306) values for the look-up table 26 and then perform an interactive process to adjust the values in the look-up table 26. In this manner, the camera 20 may perform (block 308) a transformation on the raw pixel data via the look-up table 26 and then perform (block 310) color correction. Next, the camera 20 performs (block 312) color space conversion before determining (diamond 314) whether the white color balance is acceptable. If not, the camera 20 then readjusts (block 316) the values in the look-up table 26 and then returns either to block 308 or alternatively to block 302, depending on the particular embodiment. If the camera 20

determines that the white color balance is acceptable, then the camera 20 returns to the block 302 to capture another optical image. Specification, pp. 6-7.

Other embodiments are within the scope of the following claims. For example, although a camera is described as an image processing circuit in accordance with the invention, other image processing circuits (a scanner, for example) may embody the invention. Specification, p. 7.

## VI. ISSUES

- A. **Can claims 1-7 be rendered obvious when the Examiner has failed to establish a *prima facie* case of obviousness for independent claim 1?**
- B. **Can claims 8-15 be rendered obvious when the Examiner has failed to establish a *prima facie* case of obviousness for independent claim 8?**
- C. **Can claims 16-18 be rendered obvious when the Examiner has failed to establish a *prima facie* case of obviousness for independent claim 16?**

## VII. GROUPING OF THE CLAIMS

Claims 1-7 can be grouped together; claims 8-15 can be grouped together; and claims 16-18 can be grouped together. With this grouping, all claims of a particular group stand or fall together. Furthermore, regardless of the grouping that is set forth by the Examiner's rejections, the claims of each group set forth in this section stand alone with respect to the claims of the other groups that are set forth in this section. In other words, any claim of a particular group that is set forth in this section does not stand or fall together with any claim of any other group that is set forth in this section.



## VIII. ARGUMENT

All claims should be allowed over the cited references for the reasons set forth below.

**A. Can claims 1-7 be rendered obvious when the Examiner has failed to establish a *prima facie* case of obviousness for independent claim 1?**

The method of claim 1 includes capturing an optical image to form raw data that is indicative of the optical image. The method includes using the values in a look-up table to transform the raw data into transform data that is indicative of a second image. The method includes computing a white color balance of the second image and modifying the values in the look-up table based on the computed white color balance and the values.

The Examiner rejects independent claim 1 under 35 U.S.C. § 103(a) in view of the combination of U.S. Patent No. 6,421,083 (herein called "Takakura") and U.S. Patent No. 4,335,397 (herein called "Tamura"). Takakura generally relates to a color imaging device and method. More specifically, Takakura discloses an image sensor that generates color imaging data. A digital processor 4 adjusts a color balance of the color imaging data based on color balance adjustment control data that is furnished by an information processing device 5. *See for example*, Takakura, 8:4-13. A user views an image produced by the digital processor 4 and controls the input of the image processing device 5 to adjust a color balance of the viewed image. The image processing device 5 then responds to this adjustment to write data to look-up tables (LUTs) of the digital processor

4. The values that are stored in the LUTs are used by the digital processor 4 to compensate the color imaging data that is generated by an image sensor.

More specifically, Takakura teaches LUTs 45R, 45G and 45B that are depicted in Figure 3 of Takakura. Values in the LUTs are used to modify incoming red (R), green (G) and blue (B) color image data for purposes of correcting a color balance of this data. For purposes of changing the color balance, the LUTs are rewritten with the information that is supplied by the information processing device 5. *See, for example*, Takakura, 9:40-49.

Takakura discloses that the LUTs are formed from level detectors and table memories that are depicted in Figure 4 of Takakura. *See, for example*, Takakura, 4:58-67 and 5:1-5. In operation, each level detector of the LUT references a particular address in the table memory based on the level of its incoming color signal. Thus, for example, if the incoming blue signal is at a first level, a first address of the table memory is accessed to access a particular offset for that level. If the incoming blue signal is at a different second level, a different second address of the table memory is accessed to access a different offset. Thus, Takakura teaches a system to assign different color balance offsets based on the levels of the color signals.

Takakura neither teaches nor suggests that the table memory (or the LUT in general) is rewritten based on a value previously stored in the table memory. Thus, contrary to the limitations of amended claim 1, Takakura fails to teach or suggest modifying values in a look-up table based on a computed white color balance and the

values in the table. Thus, the Examiner relies on the combination of with Takakura with Tamura to allegedly establish a case of obviousness for independent claim 1.

Tamura generally teaches a method and apparatus for digitally adjusting a white balance. More specifically, Tamura's system is an on the fly system that adjusts a color balance to keep the red and blue color balances of the processed image within predefined thresholds. The Examiner, in particular, relies on Fig. 1 of Tamura. This figure discloses gain control circuits 11B and 11R that generate correction offsets in response to signals that are received from digital-to-analog (D/A) converters 10B and 10R. The signals that are produced by the D/A converters 10R, 10B, in turn, are generated by counters 8R and 8B. These counters 8R and 8B count up or count down depending on whether the associated red or blue color component is within a predefined threshold window. Thus, for example, if the red color balance is greater than upper threshold of the window, the counter counts downwardly to downwardly adjust the offset that is provided to the red component. Similarly, if the red component is below the lower threshold of the window, the counter counts upwardly to add an increasing value to the red component to upwardly adjust its value. This same type of correction is provided by the blue counter 8B and D/A converter 10B for purposes of adjusting the blue component.

It is noted that Tamura fails to teach or suggest modifying values in a look-up table based on a computed white color balance and the values in the table. The Examiner contends that the counters 10R and 10B of Tamura allegedly teach the stored values of claim 1. However, Tamura's system is an on the fly system based on the levels of the red

green components; and thus, Tamura fails to teach or suggest adjusting the red and blue components based on a computed white color balance.

The Examiner relies on the combination of Takakura and Tamura to allegedly establish a *prima facie* case of obviousness for independent claim 1. However, the Examiner fails to establish a *prima facie* case of obviousness for independent claim 1 for at least the reason that the Examiner fails to show where the prior art contains the alleged suggestion or motivation for the modification of Tamura (in view of Takakura) to derive the claimed invention. Instead, the Examiner, having knowledge of the claimed invention, sets forth a rejection based on modifications to Tamura without showing where the suggestion or motivation for these modifications exist in the prior art.

In the Advisory Action, the Examiner contends that the alleged suggestion or motivation in the art for the combination of Takakura and Tamura is provided by Takakura's teaching of accessing values in a table memory based on the level of the color signal level detected. In particular, the Examiner refers to Fig. 4 of Takakura. Advisory Action, 3. The Examiner concludes it would have been obvious to modify Tamura so that Tamura's system applies a correction value based on the level of the color signal detected.

However, even assuming, *arguendo*, that a suggestion or motivation exists in the prior art to generally combine Takakura and Tamura, this combination does not produce the claimed invention. Rather, the Examiner is modifying Tamura with the hindsight gleaned from the claimed invention without showing where the prior art contains the alleged suggestion or motivation for this additional modification.

More particularly, modifying Tamura so that Tamura's system incorporates the level-specific offset correction of Takakura means that the window comparators 7R and 7B and counters 8R and 8B of Tamura are replaced with the level detectors and table memory depicted in Fig. 4 of Takakura. Thus, in view of this combination, the system depicted in Fig. 1 of Tamura would operate as follows. The level detectors would detect the levels of the R-Y and B-Y signals, translate the detected levels to particular table memory addresses and then use the addresses to retrieve the appropriate offsets to apply to the R-Y and B-Y signals.

However, even assuming that the suggestion or motivation exists for the above-described combination, this combination does not produce the claimed invention. More specifically, the combination of Tamura and Takakura, based on the alleged suggestion or motivation provided by the Examiner, does not produce a system in which values in a look-up table are modified based on a computed white color balance *and the values in the table*. Without showing where the prior art contains this alleged suggestion or motivation, the Examiner has failed to establish a *prima facie* case of obviousness for independent claim 1.

The Examiner's rejection assumes that the counters in Tamura would remain after the combination of Tamura and Takakura. However, this is illogical, as the Examiner fails to show why one skilled in the art, without knowledge of the claimed invention, would have kept Tamura's counters after Tamura's system is updated with Takakura's improved level-based offset correction scheme. Furthermore, the Examiner has failed to show any support as to why Tamara's system would have led one skilled in the art to

modify Takakura's system so that the values stored in the table memories are modified based at least in part on the values.

In the Advisory Action, the Examiner cites *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988). However, contrary to the Examiner's position, *In re Fine* further supports the Applicant's position that a *prima facie* case of obviousness has not been established for independent claim 1.

More specifically, in *In re Fine*, the Federal Circuit held that the Examiner had failed to establish a *prima facie* case of obviousness because of the Examiner's bald assertion that a substitution "would have been within the skill of the art," without offering any support for or explanation of this conclusion. *In re Fine*, 5 USPQ2d at 1599. The Federal Circuit agreed with the appellant that a *prima facie* case of obviousness had not been established and stated, "one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." *Id.*, 1600. *See also, W.L. Gore & Associates, Inc v. Garlock, Inc.*, 220 USPQ 303, 312-13 (Fed. Cir. 1983 ) (stating, " to imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against his teacher"); *Al-Site Corp. v. VSI Int'l, Inc.*, 50 USPQ2d 1161, 1171 (Fed. Cir. 1999) (stating, " rarely, however, will the skill in the art component operate to supply missing knowledge or prior art to reach an obviousness judgment").

"Obviousness cannot be predicated on what is unknown." *In re Spormann*, 363 F.2d 444, 448, 150 USPQ 449, 452 (CCPA 1966). Rather, the Examiner must show, with specific citations to the prior art, where the prior art contains the alleged suggestion or motivation for the modification of a reference to derive the claimed invention.

Thus, to summarize, neither reference teaches or suggests all of the limitations of claim 1. Although the Examiner reasons why one skilled in the art would have combined Tamura and Takakura, this combination alone does not produce the claimed invention without further modifications that are not supported by the cited prior art. Thus, for at least the reason that the Examiner fails to show the existence of alleged suggestion or motivation in the prior art for the modification of Tamura in view of Takakura to produce the claimed invention, a *prima facie* case of obviousness has not been established for independent claim 1.

Claims 2-7 are patentable for at least the reason that these claims depend from an allowable claim. Thus, the § 103(a) rejections of claims 1-7 are improper and should be reversed.

**B. Can claims 8-15 be rendered obvious when the Examiner has failed to establish a *prima facie* case of obviousness for independent claim 8?**

The imaging processing circuit of claim 8 includes an image sensor to capture an optical image to form raw data that is indicative of an optical image. The image processing circuit also includes a look-up table, a white color balance circuit and a second circuit. The look-up table stores values to transform the raw data into transform

data that is indicative of a second image. The white color balance circuit computes a white color balance of the second image. The second circuit modifies the values in the look-up table based on the computed white color balance and the values stored in the look-up table.

The Examiner rejects independent claim 1 under 35 U.S.C. § 103(a) in view of the combination of Tamura and Takakura. In particular, the Examiner contends that the motivation or suggestion for the combination of Takakura and Tamura exists in that the level detection-based offset correction taught in Takakura would be incorporated into Tamura's system. However, even with this modification to Tamura's system, the combination still fails to teach or suggest the claimed invention.

More specifically, incorporating Takakura's level detectors and table memories (Fig. 4 of Takakura) into Tamura's system would simply produce a system in which an offset correction is looked up in a table memory based on the level of the color signal. Thus, Tamura's counters and windows comparators would be replaced by the level detectors in table memories of Takakura.

However, such a modification still fails to teach or suggest the second circuit of claim 1. More specifically, the second circuit of independent claim 8 modifies values in the look-up table based on the computed white color balance *and the values*. To the contrary, Takakura's system simply writes new values to the table memory and does not modify existing values in the table memory based on a previously stored values. Thus, incorporating Takakura's system into Tamura's does not produce the claimed invention. Thus, the Examiner fails to show where the prior art allegedly teaches or suggests the



modification to Tamura's system to derive the claimed invention. Likewise, the Examiner fails to show where the prior art contains a suggestion or motivation to modify Takakura in view of Tamura to derive the claimed invention.

"Obviousness cannot be predicated on what is unknown." *In re Spormann*, 363 F.2d 444, 448, 150 USPQ 449, 452 (CCPA 1966). Thus, the Examiner has failed to establish a *prima facie* case of obviousness for independent claim 8.

Claims 9-15 are patentable for at least the reason that these claims depend from an allowable claim. Thus, § 103(a) rejections of claims 8-15 are improper and should be reversed.

**C. Can claims 16-18 be rendered obvious when the Examiner has failed to establish a *prima facie* case of obviousness for independent claim 16?**

The article of claim 16 includes a storage medium that is readable by a processor-based system. The medium stores instructions to cause a processor to use values that are stored in a look-up table to transform raw data that is provided by an image sensor into transform data that indicates an image. The instructions cause the processor to compute a white color balance of the image and modify the values in the look-up table based on the computed white color balance and the values.

The Examiner rejects independent claim 16 under 35 U.S.C. § 103(a) in view of the combination of Tamura and Takakura. Although the Examiner contends that the combination of Tamura and Takakura would have been obvious to one skilled in the art, this combination does not produce the claimed invention, as the Examiner fails to show

the alleged suggestion or motivation to modify Tamura (in view of Takakura) to derive the claimed invention.

More specifically, even assuming, *arguendo*, a suggestion or motivation exists for the incorporation of Takakura's level detectors and table memories into Tamura's system, this incorporation would necessarily remove the counters and window detectors of Tamura's system. Thus, the Examiner fails to show why one skilled in the art, without knowledge of the claimed invention, would have modified Tamura in view of Takakura so that values are modified in a look-up table based on a computed white color balance *and the values* that are stored in the table.

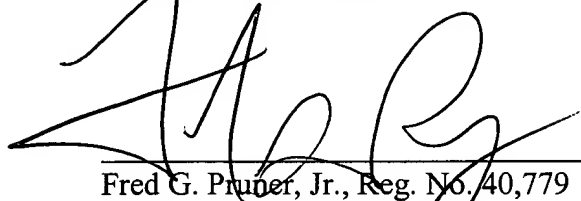
Thus, the Examiner, having knowledge of the claimed invention, selectively combines pieces from Tamura and Takakura to derive the claimed invention. However, such a piecewise combination is improper, as the Examiner must show where the prior art teaches the alleged suggestion or motivation to modify Tamura to derive the claimed invention. Likewise, the Examiner fails to show where the prior art contains a suggestion or motivation to modify Takakura in view of Tamura to derive the claimed invention.

Claims 17-18 are patentable for at least the reason that these claims depend from an allowable claim. Thus, § 103(a) rejections of claims 16-18 are improper and should be reversed.

IX. CONCLUSION

Applicant requests that each of the final rejections be reversed and that the claims subject to this appeal be allowed to issue.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'F. Pruner', is written over a horizontal line.

Fred G. Pruner, Jr., Reg. No. 40,779  
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Date: January 29, 2004

## APPENDIX OF CLAIMS

The claims on appeal are:

1. A method comprising:  
capturing an optical image to form raw data indicative of the optical image;  
using values in a look-up table to transform the raw data into transformed data indicative of a second image;  
computing a white color balance of the second image; and  
modifying the values in the look-up table based on the computed white color balance and the values.
2. The method of claim 1, further comprising repeating the using, computing and modifying until the computed white color balance is at an acceptable level.
3. The method of claim 1, further comprising repeating the using, computing and modifying for a predetermined number of iterations.
4. The method of claim 3, wherein the number of iterations depends on whether the capturing is used to capture a still image or video.
5. The method of claim 1, further comprising:  
modifying the transformed data to compensate for differences in responses to the optical image between the image sensor and a human eye.

6. The method of claim 5, further comprising:  
modifying the result of the modification of the transformed data to convert the result into a predetermined color space.

7. The method of claim 1, further comprising:  
before the transformation, modifying the raw data to interpolate pixel colors.

8. An image processing circuit comprising:  
an image sensor to capture an optical image to form raw data indicative of the optical image;  
a look-up table storing values to transform the raw data into transformed data indicative of a second image;  
a white color balance circuit to compute a white color balance of the second image; and  
a second circuit to modify the values in the look-up table based on the computed white color balance and the values.

9. The image processing circuit of claim 8, wherein, for a single capture by the image sensor, the second circuit repeatably modifies the values in the look-up table and uses the white color balance circuit to compute the white color balance until the computed white color balance is at an acceptable level.

10. The image processing circuit of claim 8, wherein, for a single capture by the image sensor, the second circuit repeatably modifies the values in the look-up table and uses the white color balance circuit to compute the white color balance for a predetermined number of iterations.

11. The image processing circuit of claim 8, wherein the number of iterations depends on whether the capturing is used to capture a still image or video.

12. The image processing circuit of claim 8, further comprising:  
a color correction circuit to modify the transformed data to compensate for differences in responses to the optical image between the image sensor and a human eye.

13. The image processing circuit of claim 8, further comprising:  
a color space conversion circuit to convert the transformed data into a predetermined color space.

14. The image processing circuit of claim 8, further comprising:  
an interpolation circuit to modify the raw data to interpolate pixel colors.

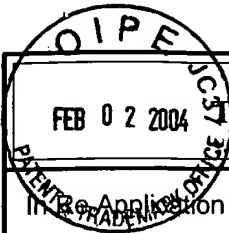
15. The image processing circuit of claim 8, wherein the image processing circuit comprises a camera.

16. An article comprising a storage medium readable by a processor-based system, the medium storing instructions to cause a processor to:

- use values stored in a look-up table to transform raw data provided by an image sensor into transformed data that indicates an image,
- compute a white color balance of the image, and
- modify the values in the look-up table based on the computed white color balance and the values.

17. The article of claim 16, the instructions causing the processor to repeatedly modify the values in the look-up table and compute the white color balance until the computed white color balance is at an acceptable level.

18. The article of claim 16, the instructions causing the processor to repeatedly modify the values in the look-up table and computer the white color balance for a predetermined number of iterations.



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FEB 02 2004

TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No.  
ITL 0237US/P7323

In Re: Application Of: Tinku Acharya, Yap-Peng Tan, Ping-Sing Tsai and Werner Metz

Serial No.  
09/359,523

Filing Date  
07/23/99

Examiner  
Dorothy Wu

Group Art Unit  
2615 ✓

Invention: Image Processing Method and Apparatus

RECEIVED

FEB 05 2004

Technology Center 2600

TO THE COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on December 16, 2003

The fee for filing this Appeal Brief is: \$330.00

- ☒ A check in the amount of the fee is enclosed.
- ☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 20-1504

Dated: January 29, 2004

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I certify that this document and fee is being deposited on January 24, 2004 with the U.S. Postal Service as first class mail under 37 C.F.R. 1.8 and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature of Person Mailing Correspondence

Janice Munoz

Typed or Printed Name of Person Mailing Correspondence

CC: